Buy U. S. War Savings Bonds and Stamps

GEOGRAPHIC SCHOOL BULLETINS

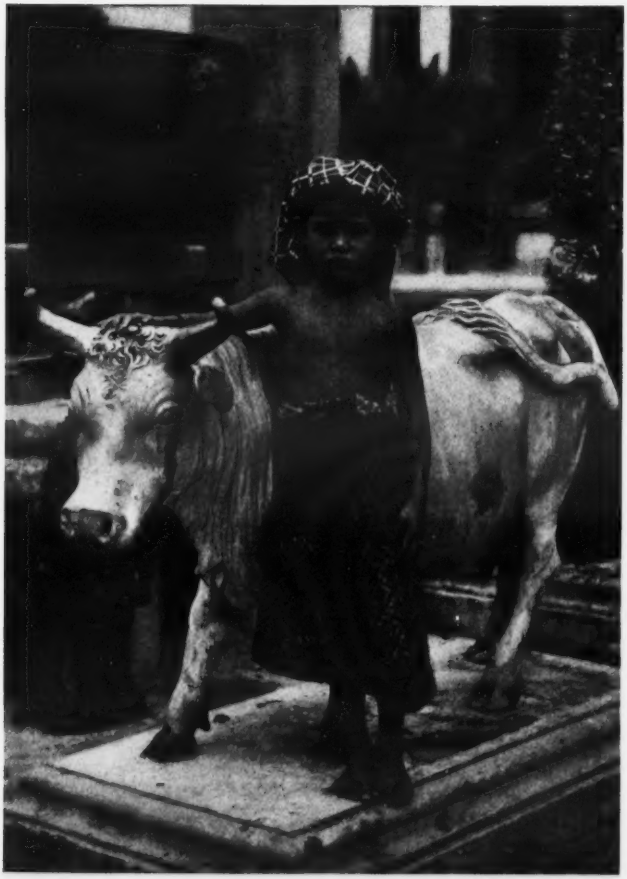
Published Weekly by

THE NATIONAL GEOGRAPHIC SOCIETY

(The National Geographic Society is a scientific and educational Society, wholly altruistic, incorporated as a non-commercial institution for the increase of geographic knowledge and its popular diffusion. General Headquarters, Washington, D. C.)

November 29, 1943. Vol. XXII. No. 21.

1. Allies' "Road to Rome" Leads to Cultural Treasures
2. Hunan Has Metal Riches and Stair-Climbing Wheelbarrows
3. Chile, Enriched by Sea Frontage, to Harness River Power
4. Sun Spots Are Only a Sideshow to the Sun's Daily Work
5. Geo-Graphic Brevities



Maynard Owen Williams

AMONG CITY SPLENDORS, COUNTRY GIRLS STILL LIKE COWS

In Thailand, where a cow is a city sight as well as a rural one, this mild-eyed stone bossy is one of a pair standing in the courtyard of the Wat Phra Keo (Temple of the Emerald Buddha) in Bangkok. Coming to the city for one of the religious festivals so important to Thailanders, this country girl in strange surroundings clings to what looks like a familiar pet. Her gaily printed sarong (a *pasin* to her) may be of cheap cotton from Japan. A century ago the women of Thailand wove most of the material for their families' clothes, but cheap and gaudily dyed textiles imported from Japan became so popular that home weaving died out in most localities. Bangkok, with its impressive array of Buddhist temples and other public buildings, will be the center of Thailand's political, as well as cultural, life until the Government moves to Petchabun (Bulletin No. 5).

UMI

Buy U. S. War Savings Bonds and Stamps

GEOGRAPHIC SCHOOL BULLETINS

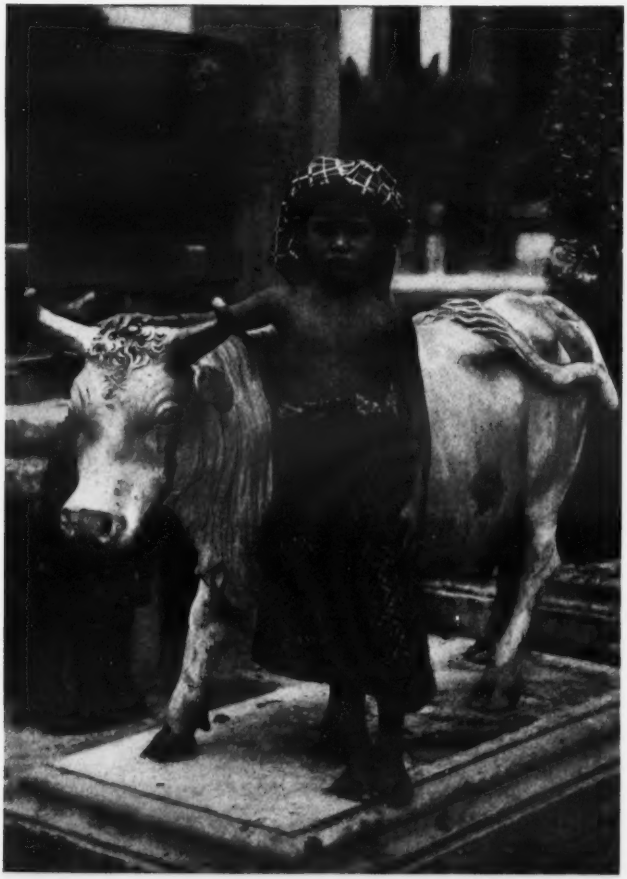
Published Weekly by

THE NATIONAL GEOGRAPHIC SOCIETY

(The National Geographic Society is a scientific and educational Society, wholly altruistic, incorporated as a non-commercial institution for the increase of geographic knowledge and its popular diffusion. General Headquarters, Washington, D. C.)

November 29, 1943. Vol. XXII. No. 21.

1. Allies' "Road to Rome" Leads to Cultural Treasures
2. Hunan Has Metal Riches and Stair-Climbing Wheelbarrows
3. Chile, Enriched by Sea Frontage, to Harness River Power
4. Sun Spots Are Only a Sideshow to the Sun's Daily Work
5. Geo-Graphic Brevities



Maynard Owen Williams

AMONG CITY SPLENDORS, COUNTRY GIRLS STILL LIKE COWS

In Thailand, where a cow is a city sight as well as a rural one, this mild-eyed stone bossy is one of a pair standing in the courtyard of the Wat Phra Keo (Temple of the Emerald Buddha) in Bangkok. Coming to the city for one of the religious festivals so important to Thailanders, this country girl in strange surroundings clings to what looks like a familiar pet. Her gaily printed sarong (a *pasin* to her) may be of cheap cotton from Japan. A century ago the women of Thailand wove most of the material for their families' clothes, but cheap and gaudily dyed textiles imported from Japan became so popular that home weaving died out in most localities. Bangkok, with its impressive array of Buddhist temples and other public buildings, will be the center of Thailand's political, as well as cultural, life until the Government moves to Petchabun (Bulletin No. 5).

UMI

Buy U. S. War Savings Bonds and Stamps

GEOGRAPHIC SCHOOL BULLETIN

HOW TEACHERS MAY OBTAIN THE BULLETINS

The Geographic School Bulletins are published weekly throughout the school year (thirty issues) and will be mailed to teachers in the United States and its possessions for one year upon receipt of 25 cents (stamps or money order); in Canada, 30 cents. Originally entered as second-class matter January 27, 1922; re-entered as of April 27, 1943, Post Office, Washington, D. C., under Act of March 3, 1879. Copyright, 1943, by National Geographic Society, Washington, D. C. International copyright secured. All rights reserved. Quedan reservados todos los derechos.

Allies' "Road to Rome" Leads to Cultural Treasures

THE drive of the Allied armies toward Rome is a reminder that the Eternal City, now a military objective, has been familiar to generations of American school children as a cultural center, past and present. Pictures of pre-Fascist Rome's art treasures and ancient buildings hang on many a schoolroom wall.

Rome is the history of the western world recorded in stone, mosaic, and bronze, and illustrated by great artists. Prewar collections in this city's museums alone would perpetuate southern Europe's art, pagan as well as Christian, if museums elsewhere were destroyed. "For twenty centuries Rome has been the storehouse of all that was beautiful," wrote the Belgian author Maeterlinck. The French historian Taine called the city "the greatest museum in the world."

Art Treasures Survive by Mistake or Disguise

Rome's art is not confined to museums. It exists in her ruined temples and triumphal arches; in her churches and libraries; her monuments and fountains.

The survival of much of the city's sculptured treasure can be attributed to the warm mild climate, or to the centuries of dust and debris which hid pagan art from Christian zealots bent on destroying it. Of the many equestrian statues of ancient Rome, only that of Emperor Marcus Aurelius survived; Christians spared it in the belief that it was a portrait of the Christian Emperor Constantine.

Adopted as a Christian church in the 7th century, the Pantheon and its portico have survived as the best preserved of the city's ancient temples. A remnant of the great Roman baths built under the Emperor Diocletian was reconstructed into a church under the direction of Michelangelo. The Baths of Caracalla are ranked second only to the Colosseum (illustration, next page).

While of greater interest for their historic meaning, ruins of the Roman Forum are not without art appeal (illustration, inside cover).

Rome's works of art are not all Roman; many came from ancient Greece, some from Egypt. The sculptured Aphrodite of Cyrene, in the Museo delle Terme, was found accidentally in Libia in 1913, by soldiers draining a rain-flooded tent.

The Italian National Gallery, which according to many critics contains Rome's finest collection of antiquities, exhibits statuary from the magnificent garden of Sallust, statues of Mars, and sculptures known to Americans under such names as the Ludovisi Juno, the Birth of Aphrodite, the Maiden of Anzio, the Boxer.

Painters Call Sistine Chapel the Greatest Art Treasure

To the American author Hawthorne, Guido's painting of Archangel Michael Overcoming Lucifer in St. Peter's was "surely one of the most beautiful things in the world." Some visitors to Rome are moved most by Michelangelo's huge statue of Moses in the church of San Pietro in Vincoli. For others the supreme appeal may be found in the Dying Gladiator in the Capitoline Museum or the Apollo Belvedere, the Laocoön group, or the Perseus in the Vatican. Plaster casts of all these are standard furnishings of most American museums and many schools.

The appraisal of paintings is equally varied. Some prefer the paintings of Correggio, Titian, or of Botticelli in the Borghese Museum. To others Raphael's Transfiguration of Christ is the great masterpiece. Also admired—and familiar

UMI

Maynard Owen Williams

YESTERDAY'S MARKET PLACE IS TODAY'S MUSEUM OF WHAT MADE ROME GREAT

Originally a market place with shops around it, under the Roman Republic the Forum became a place for town meetings and democratic discussions; decisions made there made Rome grow and made world history. To guarantee the growing population a voice in public affairs, the Forum was enlarged. The eight granite columns of the Temple of Saturn (through trees, left) survive from 497 B.C.; the three Corinthian columns of Parian marble of the Temple of Castor and Pollux (right of center, foreground), are thirteen years younger. Emperors and generals later adorned the Forum with triumphal arches like the 75-foot arch of Septimus Severus (203 A.D.) (center background). Abandonment of the Forum and its lively public life coincided roughly with Rome's loss of world supremacy. Eventually this historic area lay buried beneath forty feet of trash and rubble. The artist Raphael agitated for its excavation. It is such magnificent displays that make Rome today a museum of western culture (Bulletin No. 1).

GEOGRAPHIC SCHOOL BULLETIN

Published Weekly by

THE NATIONAL GEOGRAPHIC SOCIETY

(Founded in 1888 for the Increase and Diffusion of Geographic Knowledge)
General Headquarters, Washington, D. C.

Hunan Has Metal Riches and Stair-Climbing Wheelbarrows

CHINA'S Hunan Province has long been eyed by the Japanese as a region desirable for its supplies of food for men and war machines. Rice and tea are merely the beginning of its available resources. As a source of metals needed for war production it is China's richest area. Japanese invaders accordingly have been trying again to get their stalled drive rolling from Lake Tung Ting in the north.

Situated in east-central China, Hunan is about as big as Colorado. Before the war it had more than 28 million inhabitants, most of them farmers.

The mighty Yangtze River, which loops into the province on the northeast, dominates Hunan's commerce. The region's chief outlet is the Yangtze port of Hankow in the neighboring province of Hupeh to the north.

Lake Tung Ting Breathes In and Out

Hunan has a peculiar system of exchanging waters with the Yangtze. When the giant river of central China reaches its yearly flood level, it spills over into broad Lake Tung Ting (illustration, next page) in the northeast corner of the province. After the flood season, the lake spills its water back into the river.

High hills partition the province. The gentle slopes rise to about 2,000 feet on the average, although the sacred mountain of Hung Shan tops 4,000 feet. The highest mountains are just above a mile high. The mountains are only sparsely inhabited, however, for most of the people have their farms and towns in the lower river and lake valleys where rice fields can be irrigated. Their own impression of their province is embodied in a saying that it is three-tenths mountain, one-tenth plain, and six-tenths water.

Twisting rivers, chief of which are the Siang Kiang and the Yuan Kiang, draw the pattern of agriculture. Terraced valley farms grow rice principally. The province actually grows more rice than it consumes, and the surplus is usually shipped down the Yangtze to feed the people of crowded river ports. Orange trees and sweet potatoes grow on higher slopes above the rice fields.

Capital City Has Stair-Climbing Wheelbarrows

The distinctive crop for which Hunan is known, however, is tea. In the central part of the province, around Siangtan in the Siang Kiang valley, grows some of the finest tea of China, which usually is cured as black tea. Hunan's tea crop is normally shipped down to markets at Hankow, where in ordinary times much of it would be pressed into bricks and exported by caravan for the teapots of Mongolia and the samovars of the U.S.S.R.

Changteh on the Yuan and Siangtan and Changsha on the Siang are the chief Hunan cities. The largest and the capital is Changsha, built in the hills at the eastern edge of the province. The Siang River links the city with the Yangtze by way of Lake Tung Ting. Rail and water transport served the city with good trains and light draft steamers. It was a busy station on the north-south China railway. Steamers regularly made the 220-mile trip from Hankow. Peacetime population was about 500,000.

Changsha's streets are long and straight. The city was famous for its firecrackers, its candies, and its cleanliness. Memorable sight was the tandem-wheeled wheelbarrows. Ahead of the usual wheel, an extra one was attached to the frame. When steps had to be climbed, the handles of the barrow were lowered until the

UMI

through reproductions in American schoolrooms—are the Vatican's Murillos, Leonardo da Vincis, and Fra Lippo Lippis.

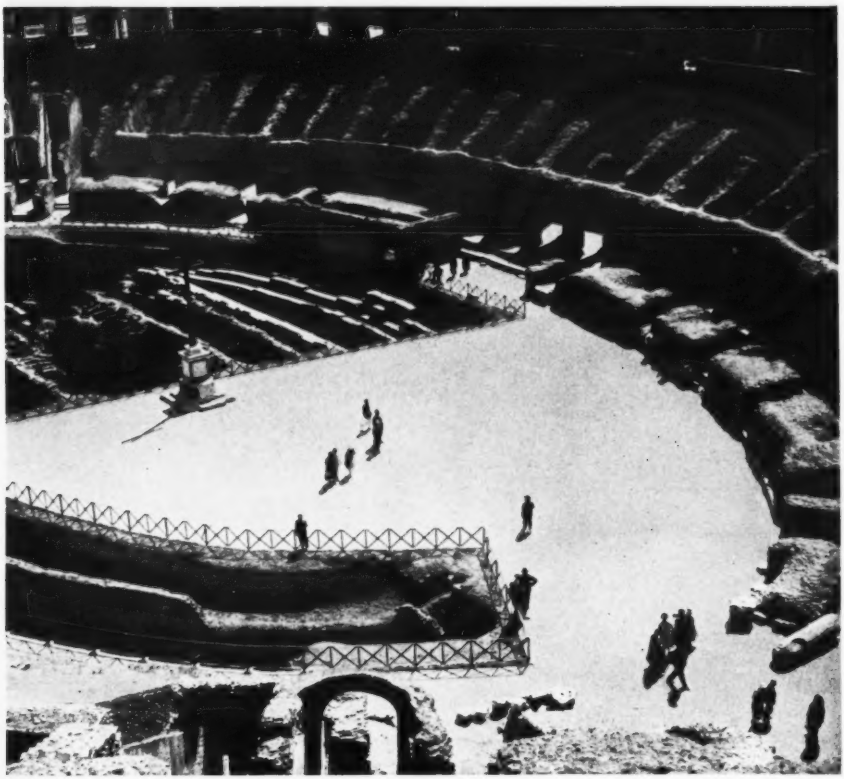
There are artists, however, who will boldly declare that Michelangelo's murals in the Sistine Chapel are the world's greatest art treasure. His gigantic painting of the Last Judgment dominates the chapel, which contains also the familiar Sistine Madonna. The genius of this master is apparent also in the design of Rome's Capitoline Museum, which now exhibits classical sculpture.

Rome's many churches treasure priceless art. St. Peter's alone contains many famous samples of the flower of 15th century Italian art—Raphael, Giotto, Bernini, Michelangelo, Bramante, Canova, and others. The Vatican contains the oldest collection of European antiquities in the world.

NOTE: Ancient Rome, with historical notes, is shown in a large-scale inset on the National Geographic Society's Map of Classical Lands of the Mediterranean. A price list of maps may be obtained from the headquarters of the Society in Washington, D. C.

For additional information, see "Italy, from Roman Ruins to Radio," in the *National Geographic Magazine*, March, 1940*; and in the GEOGRAPHIC SCHOOL BULLETINS, November 1, 1943: "The Appian Way, an Allied Road to Rome." (*Issues marked with an asterisk are included in a special list of Magazines available to teachers at 10¢ each in groups of ten.*)

Bulletin No. 1, November 29, 1943.



Fritz Henle

THE COLOSSEUM SHOWS THAT THE ORIGINAL "BIG TOP" WAS TOPLESS

Rome's four-story Colosseum originally enclosed six acres within its elliptical 160-foot walls. More than 45,000 people could be seated before the S.R.O. sign went up. Most seats in this early ancestor of the Hollywood Bowl were bleachers; some were shaded by the huge canvas awnings operated by sailors. Known in Rome as the Flavian Amphitheater, the behemoth building, completed in 80 A.D., was dubbed by strangers the Colosseum. A cross (left center) commemorates Christians martyred there. Wild beast fights were forerunners of today's circus.

GEOGRAPHIC SCHOOL BULLETIN

Published Weekly by

THE NATIONAL GEOGRAPHIC SOCIETY

(Founded in 1888 for the Increase and Diffusion of Geographic Knowledge)
General Headquarters, Washington, D. C.

Chile, Enriched by Sea Frontage, to Harness River Power

THE announcement of an eighteen-year program for nation-wide electrification, undertaken by Chile's Popular Front government, draws attention to this South American nation's unusual wealth of water-power possibilities.

Chile is a 2,600-mile-long strip sliced off the continent down the center of the Western Hemisphere's loftiest mountain ranges. The country consists of the steep westward, or Pacific, slope of the southern Andes. On the snow-swept shoulders and glaciers of these high peaks many rivers have their origin. The cold torrents furrow swiftly westward across the country in a rapid drop to the sea.

Power from these plunging rivers would help the development of industries, save coal, and encourage the home use of many of the country's resources.

Water a Versatile Resource

Water, apart from its conversion into kilowatts, has greatly influenced the life of Chile. The sea modifies the extremes of climate, changes the course of ships by the strong "set" of the mighty Humboldt Current, shapes plans and fortunes by its winds and tides and fogs, is the source of a sizable fishing and whaling industry, and provides shipping routes. It gives Chile access to foreign sources for needed machinery, textiles, and oil, and sustains the coastwise trade.

Moreover, the sea serves for boundary. All Chile's 24 provinces except three begin at the water's edge and reach inland to international frontiers.

Of the country's twelve cities with 25,000 people or more, seven are ports—Valparaiso, Concepción, Antofagasta, Iquique, Valdivia, Talcahuano, and Punta Arenas. Traffic flows downhill to the sea rather than over the steep wall of the Andes, pierced by few passes.

Used-Up Rivers Never Reach the Sea

Inland, water or the lack of it dominates the country's activities. In the north where rain and rivers are virtually unknown Chile has one of the driest deserts in the world. This desert region is valued for its rich mineral deposits of nitrate, sulphur, and borax. For a coastal stretch of about 600 miles, from the border of Peru to Copiapó, no stream crosses the desert to the sea the year around except the winding Loa. This southward-looping river, about 275 miles in length, is Chile's longest. Sister streams, which become more numerous south of the vast desert, are in many cases used up for irrigation before reaching the sea. Such a river is the Copiapó, second in size to the Loa.

The thirsty north suffers from one of the world's most peculiar blights of rainlessness. Within sight of the Pacific on the west and snowy peaks on the east, the desert in a decade cannot count on enough rain to wet a blotter. In one period of twenty years, no rain fell in fourteen. Scientists call this the result of a fairly permanent condition of high atmospheric pressure, which prevents rain-laden winds from blowing over the region.

South of Copiapó, however, rains and rivers increase so that in the soggy southern forests travelers have found it impossible to kindle a fire. Heavy winter rains in the south are followed by summer floods from melting snows, so that a fairly constant supply of water pours seaward in such rivers as the Maipo and the Rapel, the Maule and the Bio-Bio.

Chile's marginal strip of South America averages only about 100 miles in

UMI

extra wheel rose above the next higher step. Then the heavily loaded barrow seesawed from wheel to wheel until the next level stretch was reached.

Changsha excluded foreigners until the turn of this century. The change was significantly marked when Yale University established in Changsha "Yale in China," an institution including mission schools, a college, and a hospital.

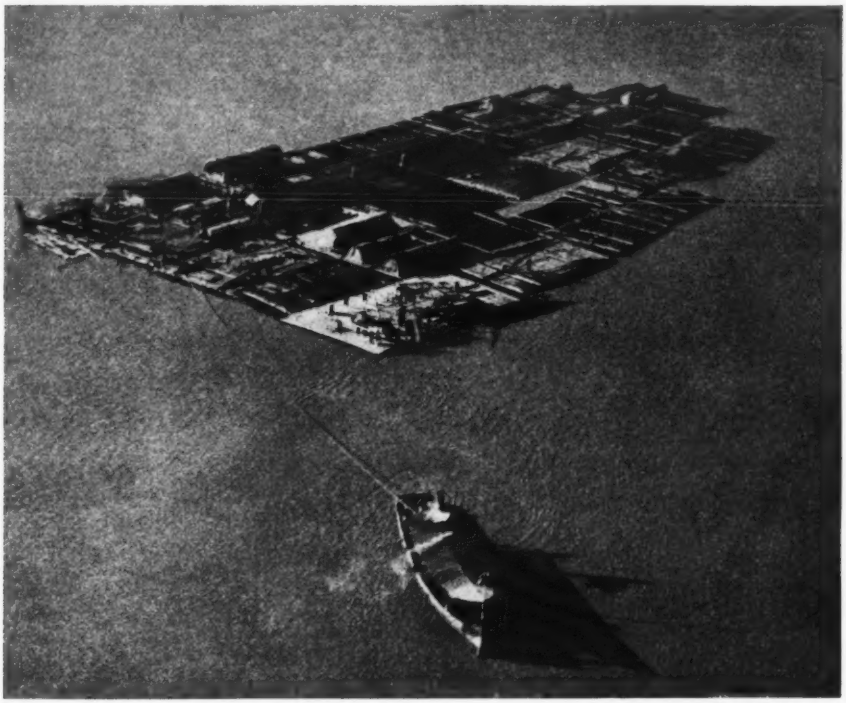
Although chiefly a province of farmers, Hunan has been especially important to the world beyond China for its mining. Tin is known to lie beneath Hunan soil, but is not yet worked to any extent. Sulphur, extracted from pyrite shales, was long in demand for firecrackers before war needs absorbed it.

Hunan was the province which once supplied most of the world's antimony and was the basis of China's virtual monopoly in the mining of this metal. Antimony is needed for ball bearings, for mixture with lead in ammunition and electric batteries. The several hundred mines of this province were the source too of much of the world's tungsten until the war diverted trade currents. Tungsten is one of the alloys needed to harden steel for armor plate and soldiers' steel helmets.

NOTE: Hunan is shown on the Society's Map of Asia and Adjacent Areas.

For further information on China, see the following articles in the *National Geographic Magazine:* "China Opens Her Wild West," September, 1942; "Taming 'Flood Dragons' Along China's Hwang Ho," February, 1942*; and "Burma Road, Back Door to China," November, 1940*.

Bulletin No. 2, November 29, 1943.



Hans Koester

A RECIPROCAL TRADE AGREEMENT MAKES TUNG TING LAKE AN INLAND SEA

The flooding Yangtze pours water into Tung Ting Lake, which floods the surrounding plain and backs up water in its tributary streams. The flood waters are welcomed all the way up the tributaries' valleys for irrigating lakeside and riverside rice fields. When floods subside Tung Ting Lake passes on the waters of its tributaries into the Yangtze. The tributary Yuan specializes in rafts of logs from central Hunan hills. Whole colonies of rafts lashed together float into and across the lake's almost currentless waters (above), towed by a steam launch. Before entering the turbulent Yangtze, the groups are broken up and each raft bobs individually down to Hankow or, in peacetime, as far as Shanghai.

GEOGRAPHIC SCHOOL BULLETIN

Published Weekly by

THE NATIONAL GEOGRAPHIC SOCIETY

(Founded in 1888 for the Increase and Diffusion of Geographic Knowledge)
General Headquarters, Washington, D. C.

Sun Spots Are Only a Sideshow to the Sun's Daily Work

WHEN blacked-out overseas radio denies you a news broadcast, or stuttering telegraph and teletype machines garble messages, blame the sun. Such effects show the long arm of the sun reaching across 93 million miles of space into man's everyday affairs on the earth. "Sun spots" are credited with the disturbances.

Such dramatic signs of the sun's power come only now and then, sometimes unseen, sometimes along with the flashing colored lights of the aurora. But day in and day out, as everyone knows but most people forget, the sun has completely dominated the earth and its life for hundreds of millions of years.

Sun Creates Food; Builds "Radio Mirrors"

It is the earth's lighting plant, its heating system, and its power source. It dishes up all weather. With its gravitational pull—as real as gigantic steel cables—the sun holds the earth captive and swings it along an oval path of seasonal changes, clocking off the years.

Most vital, and at the same time one of the most mysterious, effects of the distant sun on the earth is the process by which sunlight is transformed into food. This is known as photosynthesis: "light-put-together." When sunlight shines on the green coloring in plant leaves and in the sea's tiny floating algae, it operates in some magic way to turn "dead" water and other chemical compounds into "living" food. Since all animals live on plants or on other animals, sunlight is literally manna from heaven which feeds all living things.

Another hidden effect of the sun, recently discovered, is the creation in the upper atmosphere of invisible layers of ionized or electrified air gases, which reflect radio waves back to earth. Because of these ionized layers, a radio signal can be broadcast around the world; without such reflection, radio would reach little beyond the horizon. Disturbances of these layers result in radio blackout.

The layers are formed chiefly by ultra-violet sunlight plowing through the air. These very short light waves collide with billions of molecules of the air gases, "chipping" parts of the molecules off. The incomplete molecules are left electrified. Concentrated at fairly definite levels in layers miles thick, the electrified mass turns radio waves of certain lengths back to the earth.

"Spots" Are Spinning Craters in Glowing Sun Stuff

Sun spots do not have an everyday effect on the earth, as does the unceasing flow of light and heat from the sun. Much is yet to be learned about the spots; but some facts gleaned by telescopes and photographic plates and some theory can be pieced together to explain them plausibly. The spots seem dark, but in reality are only a little less bright than the rest of the flaming orb. They are presumably made by funnels of whirling gases (illustration, next page) that spin holes in the sun's glowing surface. The holes extend from the surface to denser material beneath. Some of these holes, or craters, are vast enough to swallow the earth; others have diameters many times greater than the earth's.

Frequently when the spot-craters are pointed directly at the earth, radio interference, auroras, and magnetic storms follow. But sometimes when the spots "draw a bead" on our planet, nothing unusual happens. On other occasions, when no visible spot is pointed our way, the familiar "sun spot effects" occur.

Apparently a crater pours out tiny particles at intervals. It is only when shot

UMI

Winthrop S. Greene

MAITENES MAKES CHILE'S TRAINS SNOW-BURNERS

Melting snows from Andean heights (background) feed central Chile's Colorado River. This water rushing downward at the Maitenes power plant (foreground) is converted into electricity for lighting Santiago and Valparaiso and also for operating much of the nation's electrified railway. A low mountain's top has been leveled off (center) to make room for a settling basin in which the Colorado's torrential waters drop their silt. From this reservoir penstocks carry the water down the mountainside to the red-roofed gray stone power plant.

width. This narrow ribbon of land slopes sharply westward from peaks of which the highest is Aconcagua, 23,081 feet high and the loftiest in the Western Hemisphere. In the seaward drop, therefore, water from Aconcagua's top would theoretically have to fall 230 feet in each westward mile. Such a turbulent violence gives Chile its own Niagara Falls on the Laja River, before it empties into the Bio-Bio. Another favorable site for power production is on the Colorado at Maitenes (illustration, left).

Few of these rivers can be navigated. Transportation has been mainly coastwise until recent years. Now a railway zigzags along the shoreline, longest link in the nation's 6,000-mile network, much of it electrified. Highways fit for motor traffic total about 20,000 miles.

Chile was the 19th American nation to join the United Nations against the Axis, leaving Argentina alone on the diplomatic fence.

NOTE: Chile is shown on the Society's Map of South America.

See also, in the *National Geographic Magazine*: "Chile's Land of Fire and Water," July, 1941*; "Inside Cape Horn," December, 1937; and "Twin Stars of Chile," February, 1929; and in the GEOGRAPHIC SCHOOL BULLETINS: December 14, 1942: "Ribbon-Shaped Chile, the Two-In-One Republic."

Bulletin No. 3,
November 29, 1943.

GEOGRAPHIC SCHOOL BULLETIN

Published Weekly by

THE NATIONAL GEOGRAPHIC SOCIETY

(Founded in 1888 for the Increase and Diffusion of Geographic Knowledge)
General Headquarters, Washington, D. C.

Geo-Graphic Brevities

KIEV, UKRAINE'S RECAPTURED CAPITAL, SYMBOL OF OLD AND NEW RUSSIA

THE recapture of Kiev by the Russians represents a prize of both practical and symbolic value.

Ancient capital of the Russians, and one of the oldest cities of the U.S.S.R., Kiev was at one time holy city of the Greek Orthodox Church. The principality of Kiev, of which the city was capital, was one of the first in Russia to adopt Christianity. So vital a part has Kiev played in the history of the nation that it has been given the title of "Mother of Russian cities."

Kiev was the capital of the Ukrainian Soviet Socialist Republic when the Nazis overran it in September, 1941. It had held this position since the establishment of the republic, with the exception of a period between 1920 and 1934 when the seat of government was at Kharkov.

Third city of the Soviet Union, Kiev had a peacetime population of nearly 850,000. It was an industrial center, a hub of printing, publishing, and education. The city's manufactures included flour, glass, cigarettes, shoes and leather goods, paper, chemicals, and machinery.

Kiev is situated at the point where the Dnieper swings southeast in a great loop. Thus control of the city gives its possessor a base for defending the vast U-shaped expanse of land west of the central and lower reaches of the river.

Kiev is a railway junction for four lines stretching northwest-southeast and northeast-southwest. The southwest line is connected with a complex network of rails that leads into the southwestern Ukraine and beyond into Poland, Bessarabia, and Romania proper. Northwestward, rail lines run across the Ukraine into central Poland. Kiev is less than 150 miles from the prewar Polish frontier.

NOTE: Kiev is shown on the Society's Map of Europe and the Near East.
See also in the GEOGRAPHIC SCHOOL BULLETINS for March 15, 1943: "The Dnepr Line a Russian Battlefront Again."

JAPS TRANSFER THAILAND'S CAPITAL TO THE JUNGLE

"EFFECTIVE by next June 1, the United States Government will move the national capital from Washington, D. C., to South Boston, Virginia."

Such an announcement would be the American equivalent of the news from southeastern Asia that the capital of Jap-held Thailand (Siam) will be moved from Bangkok to Petchabun.

Bangkok (illustration, cover) has been called "the heart of the heart" of Thailand. Chief city and port, it holds 750,000 of Thailand's 15 million inhabitants. It is a modern city and one of the communication and transportation centers of southeastern Asia. It has been the capital ever since the Burmese, in 1765, destroyed Thailand's 400-year-old former capital city, Ayudhya (Ayuthia).

Petchabun, in exchange for Bangkok's urban advantages, offers the defenses of mountains and wilderness (illustration, next page) against enemy approach. It is 190 miles inland from Bangkok, remote from railroads and main highways. Little known except as a tobacco-growing center, the small town lies on the Pasak River Valley plain, at the edge of the north Thailand mountains. Protecting ridges of hills 1,000 feet high stretch to the south on either side. The western

UMI

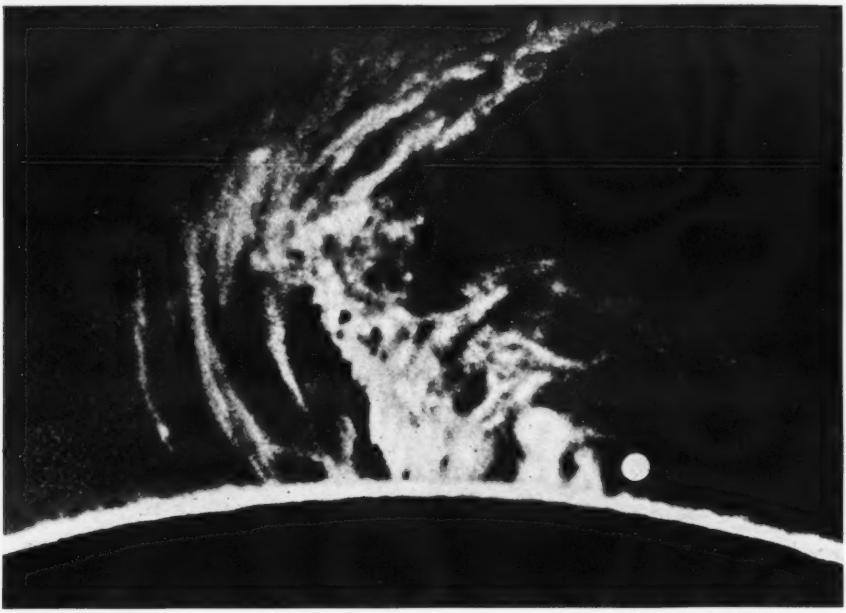
out violently enough, while the crater is properly "aimed," that they reach the earth. Some observers believe that active craters shooting off particles sometimes exist beneath the surface as "blind spots" under covering gases.

The particles that bombard the earth move at tremendous speeds. They require, according to their varying weights, from 18 to 60 hours to make the same trip. They thus fly through space at speeds ranging from 1,400 down to 400 miles per second. But they fall far short of the speed of light. At 186,000 miles a second, light bridges the 93-million-mile gulf in a little over 8 minutes.

The particles that are electrified never actually strike the solid earth. While still hundreds of miles away they are turned off to the north and south by the earth's magnetic field, the same forces which pull a compass needle into a north-south position. Under proper conditions, these captured particles set air molecules to glowing in far-northern and far-southern regions, causing auroras. They also disrupt the earth's magnetic field, interfering with the normal operation of telegraph wires. Some of the particles that are not electrified may penetrate into the atmosphere and upset the balance there. At any rate, some phase of sun spot activity seriously interferes with the radio-reflecting layers.

NOTE: For material on astronomy, see these articles in the *National Geographic Magazine:* "The Heavens Above," July, 1943; "News of the Universe," July, 1939*; "Observing an Eclipse in Asiatic Russia," February, 1937*; and "Observing a Total Eclipse of the Sun," November, 1932*. A separately bound reprint of "The Heavens Above," including star charts, is available from the Society's headquarters for 25¢ a copy.

Bulletin No. 4, November 29, 1943.



Carnegie Institution of Washington

THE SUN IS A GIGANTIC FLAME-THROWER

Such tremendous outbursts of flaming gas, known as prominences, are constantly taking place on the sun. They are not easy to observe except during total eclipses when the flames that happen to be licking outward at the edge of the sun's disk as viewed from the earth are silhouetted against space. The much more numerous outbursts that must be taking place inward from the edge, some of them directed toward the earth, cannot be distinguished. Some astronomers have speculated that the greatest of these flames, surging outward, may be accompanied by the discharge of particles like those that are ejected from sun spots. The flare shown in the photograph is about 140,000 miles high; presumably others reach 950,000 miles. The white disk shows how small the earth would be in comparison.

ridge separates the town from the rice plains of the Me Nam valley. The longer eastern ridge is a barrier to approach from the wild Korat Plateau.

Petchabun is linked with the main centers of Thailand by an improved "fair weather" road which runs west 50 miles to the railroad and highway joining Bangkok and Chiengmai. It is 220 air miles southeast of Chiengmai, second city of Thailand and site of a Jap air base. Three hundred and twenty miles to the west of the new capital is Rangoon, chief city and port of Burma.

Except for its tobacco fields, the Pasak valley at Petchabun is a thick jungle of vines, undergrowth, and small trees. During the rainy season, June to October, small boats can reach the town. Through the six dry months, when the Pasak's upper reaches are not navigable, roads can be improved and buildings constructed to house the puppet administration which the Japanese have imposed on Thailanders.

NOTE: Thailand is shown on the Society's Map of Asia and Adjacent Areas.

See also, in the *National Geographic Magazine:* "Temples and Guns in Thailand," November, 1941*; and "Land of the Free in Asia," May, 1934*; and these GEOGRAPHIC SCHOOL BULLETINS: "Kings and Buddhas Complicate Indo-China's Thailand Border," January 13, 1941; and "Thailand (Ex-Siam): A Two-Way Buffer State," December 9, 1940.

Bulletin No. 5, November 29, 1943.

Ernest B. Shoedsack

BE IT EVER SO HUMBLE, HOME IS HIGH ON STILTS IN THAILAND

Thai farmers accomplish two purposes by building houses on stilts. The house is high and dry when the rainy season turns the level land into a swamp from June to October, and the occupants are protected against jungle beasts prowling into the clearing. The ground floor shelters farming implements—usually homemade. Built of bamboo, with thatched gables, the house has several rooms, and the high veranda can serve also as a dining room. Thai women enjoy as much freedom as men and work even harder. Most household utensils are products of their handiwork. The woman carrying two bowls on a pole over her shoulders probably made them herself. Bamboo and rattan are used for homemade furniture. For containers the Thai housewife has gourds, coconut shells, pottery, and bamboo baskets made in intervals between outdoor work in vegetable garden or rice fields. In such country districts as this, householders are required, under the Kitchen Gardens Act of 1939, to cultivate vegetables and breed livestock for their own use. Into these self-sufficient rural surroundings Thailand is moving its capital to Petchabun.

UMI